Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ERIC A. JACOBSEN

Appeal No. 2005-0305
Application No. 09/855,132

ON BRIEF

Before THOMAS, GROSS, and BARRY, Administrative Patent Judges.

THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

Appellant has appealed to the Board from the examiner's final rejection of claims 1 through 30.

Representative claim 1 is reproduced below:

1. A method comprising:

basing a discrete frequency transformation on the number of subcarriers in a predetermined set of subcarriers, one or more subcarriers of the set assigned to modulate data and the remaining subcarriers of the set not assigned to modulate the data;

performing the discrete frequency transformation on the data to modulate the data; and

excluding from the transformation mathematical operations associated with the subcarriers not assigned to modulate the data.

The following references are relied on by the examiner:

van Nee	6,175,550	Jan. 16, 2001
Böhnke	6,535,501	Mar. 18, 2003 (filed Nov. 5, 1998)

Claims 1 through 30 stand rejected under the second paragraph of 35 U.S.C. § 112. The basis of this rejection is the examiner's view that the limitation "discrete frequency transformation" is unclear because it is not described in the specification or well known in the art.

Claims 1 through 8, 10 through 18, 20 through 28 and 30 stand rejected over prior art. As to claims 1 through 7, 10 through 17, 20 through 27 and 30, the examiner has rejected these claims under 35 U.S.C. § 102(e) as being anticipated by van Nee.[1] A separately stated rejection of dependent claims 8, 18 and 28 under 35 U.S.C. § 103 relies upon van Nee in view of Böhnke.

[1]The bottom of page 2 of the answer indicates the examiner has withdrawn the rejection of claims 9, 19 and 29 under 35 U.S.C. § 102(e).

Rather than repeat the positions of the appellant and the examiner, reference is made to the brief and reply brief for appellant's positions, and to the answer for the examiner's positions.

OPINION

Turning first to the rejection of claims 1 through 30 under the second paragraph of 35 U.S.C. § 112, we do not agree with the examiner's assertions that the feature of a "discrete frequency transformation" in the claims on appeal is indefinite or otherwise unclear since we do not agree with the examiner's basic view that the quoted term is not described in the specification as filed.

The initial portion of page 1 of the specification as filed recognizes that Orthogonal Frequency Division Multiplexing (OFDM) signals utilize prior art Fast Fourier Transforms (FFT) and an Inverse FFT (IFFT). Specification page 3 notes at lines 21 and 22 that the "encoder 12 [in figure 1] provides the encoded data (via communication lines 13) to an Inverse Discrete Fourier Transform (IDFT) engine 14 of the transmitter 10." Specification, page 4, line 17 through specification, page 5, line 17, teaches that the present IDFT engine 14 differs from the prior art IFFT in that the IDFT only performs mathematical

operations that are associated with the assigned subcarriers and does not perform such mathematical operations that are associated with unassigned subcarriers. Moreover, appellant's argued teachings at specification, page 9, lines 19 through 25, essentially define DFT and IDFT as respectively Discrete Frequency Transformations and Inverse Discrete Frequency Transformations consistent with the above noted teachings which modify well known FFT and IFFT transforms of the prior art.

It is thus apparent to us that the disclosure as filed clearly is not indefinite as argued by the examiner and is clear to the artisan since it builds upon what is known in the prior art. That a "discrete frequency transformation" may refer either to a DFT or an IDFT does not render the claims indefinite for reciting Discrete Frequency Transformations in a general sense by the mere use of the alternative since the artisan clearly can reasonably determine the metes and bounds (the limit being two choices) of the nature of the claimed subject matter based upon the disclosure and the artisan's own understanding of the prior art. Therefore, the decision of the examiner rejecting claims 1 through 30 under 35 U.S.C. § 112, second paragraph, is reversed.

As to the remaining rejections of substantially all of the claims on appeal under 35 U.S.C. § 102 and 35 U.S.C. § 103, we sustain the rejections essentially for the reasons set forth by the examiner in the answer as embellished upon here. In accordance with appellant's characterization of the issues at the bottom of page 12 of the principal brief on appeal and the grouping of the claims at page 13 of this brief, the nature of the arguments actually made with respect to these art rejections beginning at the bottom of page 15 of the principal brief on appeal presents arguments only as to the subject matter of independent claims 1, 11 and 21 on appeal rejected under 35 U.S.C. § 102. In so doing, appellant has presented no arguments with respect to the rejection under 35 U.S.C. § 103 of dependent claims 8, 18, and 28, preferring that patentability issues regarding these claims be determined on the basis of our findings with respect to the rejection of their respective independent claims 1, 11 and 21 on appeal.

As noted at the bottom of page 7 of the answer, the examiner correctly characterizes that appellant presents similar arguments with respect to each independent claim 1, 11 and 21 on appeal at respective pages 16, 19 and 20 of the brief by arguing "van Nee fails to teach the exclusion of mathematical operations that are

associated with subcarriers that are not assigned to modulate data." We do not agree with appellant's arguments from this quoted portion of the brief nor do we agree with appellant's additional urging at the bottom of page 16 of the brief that the exclusion and mathematical operation is not implicit from the language that states that an X-point IFFT is being performed rather than N-point FFT according to the teachings of van Nee.

The scalablity of the OFDM system in van Nee is emphasized in the abstract, summary of the invention, throughout the disclosure as well as summarized again at the last column of this patent. Included within the scalability teachings is the ability of the control circuitry 15 in representative figure 1 for the transmitter of van Nee's device to scale the number of carriers. The examiner's arguments beginning at page 7 of the answer characterize these scalability teachings as the ability to "scale down" the number of carriers and thereby exclude carriers to reduce implementation of the complexity of the system.

The summary of the invention contains two key indicators of the substance of the subsequent detailed disclosure. The first teaching in the paragraph bridging columns 1 and 2 of this reference teaches that "a coded OFDM modulation system can be designed with an upper limit on the number of carriers and a

variable system duration. The control circuitry can dynamically scale the number of carriers below the upper limit on the number of carriers." Column 1, lines 63 through 67. The second portion of the summary at column 2, lines 14 through 17, teaches "the mobile units can have lower data rates than the base stations by allocating only a fraction of the total number of carriers to each mobile, while the base stations transmit at all carriers simultaneously." This latter teaching is with respect to the operability of the system in figure 5.

The key features of representative independent claim 1 on appeal is that the discrete frequency transformation is only applied to the number of subcarriers of a predetermined set of carriers, where the discrete frequency transformation only occurs for those subcarriers that are to modulate the actual data, with the additional requirement that any remaining subcarriers not assigned to modulate the data are excluded from the mathematical transformation operations.

These features are implicit within the teachings beginning at column 1 of van Nee. It is clear that OFDM operations occur with respect to N orthogonal carriers as known in the prior art as discussed at column 1, lines 14 through 16. The initial lines of column 3 of van Nee also indicate that for purposes of the

ensuing discussion throughout the patent, the number of carriers considered to be a maximum is also the same number (N). The detailed discussion of how the control circuitry 15 in figure 1 scales the number of carriers begins at column 5, line 58. The discussion at lines 60 through 62 teaches the control circuitry 15 scales the number of carriers by transmitting a subset of the maximum number of carriers designed for the particular OFDM system, the emphasis being upon the use of the words transmitting and subset. This is also discussed at column 6, lines 10 through 18. The example given at lines 12 through 17 is significant when it states that "the N-points IFFT **16** can be dynamically reduced to a X-points IFFT **16** where X < N. In this particular example, the IFFT **16** is designed to handle the end carriers as the maximum number of carriers and dynamically scaled to less than N carriers by performing an X-point IFFT **16**."

It is thus clear to the artisan and to us that of the maximum number of N usable subcarriers in the "set of subcarriers" as set forth in claim 1 on appeal, the subset of X subcarriers is actually utilized for performing X-point Inverse Fast Fourier Transform mathematical operations in the same manner as set forth in claim 1 on appeal. It is thus clear as well from the showing in figure 2 and the statement at column 6, lines 55

through 57, that "[d]ecreasing the number of carriers N will similarly lead to decreasing the width of the transmitted OFDM power spectrum." The discussion of figure 5, column 8, lines 19 through 27, makes it clear as well that selectively different remote stations 74 may "send data on respectively different numbers of carriers at the same time." The discussion beginning at line 41 of column 8 also indicates that transmitting operations of the subsets of carriers may be asymmetric, with the emphasis again on the transmittability indicating only that certain ones of the subcarriers are actually used for the transformation operations. Again, the discussion in the paragraph at the beginning of column 9, line 24, indicates that only a certain variable number of carriers is actually "used" for transmitting operations.

We therefore do not agree with appellant's arguments presented in the brief that van Nee does not teach the exclusion of mathematical operations that are associated with subcarriers that are not assigned to modulate data. We also don't agree with the related argument that the exclusion of mathematical operations is not implicit from the language of the above-noted teachings in van Nee. It is unfortunate that the examiner has chosen to characterize the exclusion feature of the claims on

appeal as being inherent in van Nee's system since it is clear to us from the fact that the reference plainly teaches that only certain subcarriers X of the maximum number available in the set N are actually used for the transmitting operations in the mathematical transformation operations. The teaching of the exclusion is clearly properly to be inferred by the reader-artisan within van Nee's teachings rather than an inherent part of van Nee's systems. On the other hand, we recognize appellant's argument at page 16 of the brief that van Nee does not teach explicitly the mathematical exclusion of the type set forth at the end of representative independent claim 1 on appeal. The examiner's remarks in the paragraph bridging pages 7 and 8 of the answer clearly implicitly recognize the teaching value of van Nee where the examiner states in the examiner's own words that "[s]caling down the number of carriers clearly means selecting only a certain number of carriers to use in the modulation process; and scaling down unambiguously means that non-selected carriers are not going to be included in the modulation process."

We are equally unpersuaded by appellant's arguments presented in the reply brief at pages 2 and 3. The above noted teachings clearly traverse appellant's arguments here because it is clear to the reader-artisan that the X-point IFFT operations in van Nee are based on N subcarriers as the maximum number of the set available from which a subset of X is chosen. As emphasized in our earlier remarks, the claimed "set of subcarriers" is not limited to X, but is in fact plainly taught to be N from which a subset X is dynamically scalably used.

In view of the foregoing, we have reversed the examiner's rejection of claims 1 through 30 under the second paragraph of 35 U.S.C. § 112. On the other hand, we have sustained the selective rejections of claims 1 through 8, 10 through 18, 20 through 28 and 30 under 35 U.S.C. § 102 and 35 U.S.C. § 103. Therefore, the decision of the examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

JAMES D. THOMAS
Administrative Patent Judge)

ANITA PELLMAN GROSS
Administrative Patent Judge) BOARD OF PATENT APPEALS AND INTERFERENCES

LANCE LEONARD BARRY
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JDT:hh

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